Case 2070

Treatment of gastric varices by balloon–occluded retrograde transvenous obliteration (BRTO)

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Patient: 71 years, female

Clinical History:
A patient with long-standing liver cirrhosis (hepatitis C related).

Imaging Findings:
The patient had been suffered from hepatitis C related liver cirrhosis since 1993. In April 2002, she underwent gastrointestinal endoscopy (Fig 1) and CT (Fig 2), which revealed gastric varices. Arteriography was performed via the right femoral approach with selective catheterization of the celiac trunk, splenic artery and superior mesenteric artery (Fig 3-A, B). A balloon catheter was also inserted into the gastro-renal shunt via the right femoral vein approach (Fig 4). Since the gastric varices were not visualized, because of another collateral vein (left inferior phrenic vein), we occluded this out-flowing vein collateral with the micro-coils at first. After coil embolization, the angiogram revealed gastric varices clearly (Fig 5). We inserted a 2.7F microcatheter through a balloon catheter into gastric varices. While the balloon blocked blood flow, 17 cc of the sclerosing agent (5% ethanolamine oleate–iomepr, EOI) that agglutinates platelets, was injected slowly with fluoroscopic monitoring until the gastric varices had been completely filled (Fig 6). After seven hours, the muddy EOI mixture was withdrawn as much as possible under fluoroscopic observation. During injection of 5% ethanolamine oleate (EO), haptoglobin was administered continuously to prevent possible renal impairment due to hemolysis caused by its overflow into the systemic circulation. Follow up contrast enhanced CT one week after BRTO showed gastric varices as non-enhanced lesion that means clot formation (Fig 7). Gastrointestinal endoscopy two months after BRTO shows no varices (Fig 8). She had no complication except for slight fever. There was no significant hepatic and renal function damage.

Discussion:
The rupture of gastric varices results in a 55% mortality because of their larger blood flow compared with those of esophageal varices. Therefore prophylactic treatment must be considered. Endoscopic injection sclerotherapy (EIS), surgery or transjugular intrahepatic porto-systemic shunt (TIPS) procedure has been performed for the treatment of gastric varices. However, EIS has been reported to have no effect, because the sclerosing agent flows rapidly into systemic circulation through gastro-renal or spleno-renal shunt. Surgery is a contraindication for the patients with poor general condition such as severe liver cirrhosis. TIPS procedure does not always result in regression of gastric fundal varices. Its success rate was reported to be only 50%. In contrast, our initial success rate was 83.3%(5/6) and the final success rate was 100%. Some authors also reported that their success rate of disappearance or clotting of gastric varices was 97-100%. Thus, balloon–occluded retrograde transvenous obliteration must be the simplest, the
safest, and most reliable treatment for gastric varices.

**Differential Diagnosis List:** Treatment of gastric varices by balloon–occluded retrograde transvenous obliteration (BRTO)

**Final Diagnosis:** Treatment of gastric varices by balloon–occluded retrograde transvenous obliteration (BRTO)

**References:**


Figure 1

Description: Before BRTO, isolated varices are evident at the gastric fundus (arrows). Origin:
Description: Before BRTO, the white arrows show gastric varices and the black arrows indicate the shunts. Origin:
Figure 3

Description: Before BRTO, gastric varices (arrows) can be seen at the gastric fundus. Origin:
Description: Splenic angiography shows gastric varices (black arrows) at the gastric fundus. The white arrows indicate gastro-renal shunt. Origin:
Figure 4

Description: The gastric varices were not visualized because contrast medium flows out to the dilated collateral vein (inferior phrenic vein, arrows). The long arrow indicates the balloon. Origin:
Description: After embolization of the collateral vein (inferior phrenic vein), gastric varices can be seen.
Origin:
Figure 6

Description: The catheter was inserted retrogradely via a gastro-renal shunt. Blood flow was blocked by the balloon, and 17ml of 5% ethanolamine oleate-iomepril was injected. Origin:
Figure 7

**Description:** After BRTO, the gastric varices (short arrows) and the shunt (long arrows) are not enhanced, suggesting complete coagulation. **Origin:**
Description: Two months after BRTO, the varices have disappeared. Origin: